

DRY POWDER INHALER**BACKGROUND**

The invention relates to an inhaler for inhaling powdered pharmaceutical compositions from capsules which are inserted in a capsule holder provided in the inhaler before use. After the capsule has been inserted in the capsule holder the patient can press an actuating member which can be moved out of a resting position, thereby cooperating with at least one pin which can stick into the capsule holder. The capsule is pierced by the minimum of one pin and the pharmaceutical composition is released.

An inhaler of this kind is described for example in EP 0703800 B1 or EP 0911047 A1. The inhaler known from the above mentioned specifications has a dish-shaped lower part and an equally dish-shaped lid which fits it, these two parts being capable of being flipped apart for use, about a joint provided in the edge portion. Between the lower part and the lid, a mouthpiece which can also be flipped open and a plate below it with a capsule holder provided underneath also act on the joint. After the individual assemblies have been flipped open the patient can insert a drug-filled capsule in the capsule holder, pivot the plate and capsule holder and the mouthpiece into the lower part and pierce the capsule by means of a spring loaded actuating member projecting laterally from the lower part. The patient being treated then draws the pharmaceutical composition into his airway by sucking on the mouthpiece.

The intention is to improve the known inhalers still further in terms of their handling.

SUMMARY OF THE INVENTION

This aim is achieved according to the invention with an inhaler according to a first embodiment, wherein the actuating member is constructed as a double function actuating member by means of which, in a first actuation, the closure element for pivoting the lid can be detached from the lower part, and by means of which, in a second actuation, the procedure for piercing the capsule as described above can be carried out.

An advantage of the invention is that the forces needed to release the lid from the mechanical latching are not introduced directly through the lid but instead through the double function actuating member. This ensures quick and reliable opening of the lid with a clockwork-type mechanism, to make the inhaler ready for use.

In order to allow the lid to be released from the lower part by a clockwork-type mechanism, the double function actuating member has on its upper side a recess which is inclined so as to form a sliding surface for the closure element in the form of a tilting plane and to release the lid from the lower part as the double function actuating member is actuated and hence moved forward. The recess may vary in size. The minimum size must be sufficient to enable the lid to be released from the lower part by a clockwork type mechanism. The maximum size depends on the upper surface of the double function actuating member. The actual opening movement of the lid can then be carried out as previously by actuation of the lid by the patient, opening it fully.

The mouthpiece, which can also be flipped aside, is provided according to the invention with a gripping aid which ensures quick and reliable opening of the mouthpiece. The gripping aid is arranged so that the contact with the mouthpiece is outside the area of the mouthpiece which the patient has to place in his mouth when sucking. The contact surface for opening and the contact surface for sucking are clearly

separated from one another thanks to the shape and appearance of the mouthpiece. Consequently, the mouthpiece has an appearance which is improved both optically and practically, which enables the user to handle it intuitively and at the same time ensures optimum hygiene. This is particularly important in the region of the mouthpiece as this component is placed in the mouth when the inhaler is used.

The clockwork-like opening mechanism for the lid according to the invention and the gripping aid on the mouthpiece according to the invention are of great importance, particularly at the start of an asthma attack, as they provide a secure grip and an effective arrangement for patients who would otherwise find it difficult to use the inhaler, possibly because they were suffering from arthritis or had some other restriction to the mobility of their fingers.

In a preferred embodiment, in addition to the spring element between the double function actuating member and the capsule holder for assisting the return of the double function actuating member, at least one other spring element may be provided between the plate and lower part, to assist the opening movement, this additional spring element allowing the lid and/or the mouthpiece to spring open, if the dimensions are suitably selected, thereby completing the clockwork-like opening mechanism.

Preferably, the double function actuating member is movably mounted on the plate or on the capsule holder. The plate and/or capsule holder thus form or forms an abutment for the double function actuating member which slides along the plate when moved from the resting position into the functional position and is guided thereby, for example by means of a guide rail.

In a favourable embodiment, the double function actuating member is spring-loaded. The restoring force which is present even in the resting position ensures that after the double function actuating member has been used it is returned to the resting position and thus the inhaling process can be started or continued.

Advantageously, the double function actuating member comprises a main body and two parallel guide arms engaging thereon. The guide arms project into the lower part and, together with corresponding inserts, e.g. with guide sleeves provided on the outside of the capsule holder, serve to guide the double function actuating member as it moves from the resting position into the various operating positions and back to the resting position.

The guide arms may have end stops at their end remote from the main body, these end stops abutting on the guide sleeves in the resting position. This creates a spring bias on the double function actuating member.

In a preferred embodiment the main body of the double function actuating member has an upper rifled surface and at least one lateral rifled surface. These rifled surfaces are both design elements and help to provide optimum grip during actuation. They are on the main body of the double function actuating member outside the inhalation area and consequently do not come into contact with the patient's mouth area. Moreover, the rifled surfaces may be smaller in area than the rifling of the overall surface and still provide a guarantee of safe and rapid use of the inhaler.

Expediently, the upper rifle surface in the resting position is formed, in its area nearest the lid, with a recess to accommodate the closure element of the lid. Inside the recess the side wall directed towards the lateral rifled surface is inclined so that when the main body is inserted it forms a sliding surface for the closure element and in this way the closure element together with the lid is raised out of the latched position.